Effects of Purchasing Bull or Steer Calves on Receiving Performance and Wheat Pasture Gain

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Story in Brief

One hundred bull calves and ninety-nine steer calves, purchased at Oklahoma City Stockyards, were used to determine the difference in performance of sale-barn calves bought as bulls and castrated at processing compared to calves bought as steers during a 42-d receiving trial and subsequent wheat pasture grazing. Half of each treatment also received an estrogenic implant (10 mg estradiol benzoate and 100 mg progesterone) to determine the effect of implant at time of processing on future performance. The steer calves had greater daily gains than the purchased bull calves during the 42-d receiving period, as did the calves implanted at processing compared with non-implanted calves. However, calves bought as bulls had greater total wheat pasture gains than those purchased as steers. Administering an implant during the receiving period had a significant effect on wheat pasture average daily gain (ADG). Final body weights and overall ADG showed significant differences due to the main effect of implant treatment.

Key Words: Castration, Implants, Receiving Cattle, Wheat Pasture

Introduction

Beef production historically has existed as a highly segmented industry with various segments being owned and operated independently of one another. Often, profitability of one segment has occurred at the expense of another, with little or no attention afforded to overall profitability of the entire production system. Understanding interactions among various phases of beef production are key to identifying the means of fully capitalizing on their relationships (Drouillard, 1999). The objective of our study was to determine the difference in performance of sale-barn calves bought as bulls and castrated at processing vs comparable steer calves, during a 42-d receiving trial and subsequent wheat pasture grazing.

Materials and Methods

Animals. A total of 100 bull (527 lb initially) and 99 steer (519 lb initially) calves of sale-barn origin (Oklahoma City Stockyards) were received in two loads one week apart at the Willard Sparks Beef Research Center during September 2002 (Table 1).

Table 1. Load summary

		Bulls			Steers		
Load	Arrival	Head	Inwt (lb)	SD	Head	Inwt (lb)	SD
A	9/10/02	57	520	6	52	549	6
B	9/17/02	43	539	7	47	487	7
Total		100	527	12	99	519	12

Processing. On arrival (d 0), calves were allowed to co-mingle and rest for approximately one hour in a processing facility alley prior to the pre-processing procedures of assessing overall health, individual weight (designated as INWT and considered to be shrunk), determination of sex (bull, steer), trimming of tails, and individual identification. Calves were then randomly and evenly distributed to two holding pens overnight, given ad libitum access to water and prairie hay, and processed prior to feeding the next day. Processing (d 1) included individual weight, tipping of horns, vaccination for viral respiratory diseases (BRSV-Vac 4[TM1], 2 mL sub-Q; Vision 7[TM2], 2 mL sub-Q), and treatment with anthelmintics for internal and external parasites (Ivomec-Plus[TM3], 1mL/110 lb sub-Q); BRSV-Vac 4[TM] was boostered on d 14. In addition, bulls were castrated using a Newberry Knife and a single crimp emasculator. Subsequent weights were taken on d 0, 14, 28, and 42. On d 41, calves received one-half of the previous day's ration and were not permitted access to water from 1700 h until after the final weight was recorded on d 42.

Treatments. Throughout the study, the term "bull" refers to calves that were received as bulls and castrated at processing. Castrated bull calves (n = 4 pens/load) and steers (n = 4 pens/load) were blocked by initial BW into two weight classes (heavy and light) and randomly assigned to pens. Within each pen, one-half of the calves were randomly assigned to implant treatments of 1) Component E-C w/Tylan[â] (10 mg of estadiol benzoate and 100 mg progesterone), or 2) no implant.

Diet. A "starter diet" containing 15% more cottonseed hulls and 15% less whole corn than the receiving diet (Table 2) was offered ad libitum for the first three days of the trial. The diet was then switched to the receiving diet (formulated for 550 lb calves to gain 2.2 lb/d) and was offered once daily at 0730 h. Delivered feed was increased on an ad libitum basis for the first 28 d. In order to prevent excessive BW gains prior to grazing wheat pasture,

all pens were program fed to gain 1.8 lb/d for the final 14 d of the receiving study.

Table 2. Ingredient and nutrient composition of receiving diet

Ingredient	% DM
Corn, whole shelled	49.7
Cottonseed hulls	12.0
Ground alfalfa	25.0
Molasses	3.0
Pelleted supplement[a]	10.3
Nutrient	DM basis
Nem, Mcal/cwt	82.23
NEg, Mcal/cwt	49.93
Crude protein, %	14.60
Calcium, %	.95
Phosphorus, %	.31

[a]Pelleted supplement composition: Soybean meal (47.7%) 58.4%, Cottonseed Meal 29.2%, Limestone (38%) 9.7%, Salt 2.3%, Vitamin A (30,000 IU/g) .18%, Rumensin 80 .16%, Vitamin E (50%) .04%, Selenium 600 .01%

Health Management. Calves were observed daily at approximately 0730 h for signs of respiratory disease and other ailments. Two or more clinical signs of disease (depression, lack of

fill, coughing, physical weakness, altered gait, and ocular or nasal discharge) were required to designate a calf as a "pull" and eligible for further review. Pulled calves were returned to the processing area, weighed and rectal temperature was measured. A rectal temperature of 104°F or higher constituted a calf as "sick" and eligible for a prescribed regimen of anti-microbial drug treatment therapy (Table 3). Regardless of final diagnosis, all information was recorded on an individual "sick card" and filed by pen for future analysis.

Table 3. Schedule of Antibiotic Treatments

Antibiotic Treatment	Severity score[a]	Rectal temp	Drug therapy[b]
First	Mild or >	104° F or >	Micotil[c]
No further treatment for at least 48 h			
Second	Mild or >	104° F or >	Baytril[d]
No further treatment for at least 72 h			
Third	Mild or >	104° F or >	Excenel[e]
Repeat in 48 h regardless of severity score or rectal temperature			

[a]Subjective scores indicating severity of disease

[b]Administered according to label recommendations

[c]Elanco Animal Health, Indianapolis, IN

[d]Bayer Corporation, Shawnee Mission, KS

[e]Pharmacia & Upjohn Animal Health, Kalamazoo, MI

Wheat Grazing.

Following the 42-d receiving period, all calves were implanted with Component E-S (20 mg estradiol benzoate and 200 mg progesterone) and distributed by original load to two wheat pastures in west central Oklahoma (Piedmont and Thomas). Cattle were weighed off wheat (Wheat Wt) in January and February at the discretion of the owner and weights were pencil shrunk 2-4% depending on how long the cattle had been penned.

Statistical Analysis. Feedlot performance, health data, and wheat pasture gains were analyzed using separate models in the MIXED procedure of SAS, with fixed effects of sex, implant, and sex x implant. Pen represented the experimental unit for feedlot performance variables (average daily gain, dry matter intake and gain efficiency). Individual calf served as the experimental unit for implant effects, health related variables, and wheat pasture gains. Load or pasture location served as a random variable in the respective statistical models.

Results and Discussion

Receiving Performance. Beginning and ending body weights, as well as total gain (d 0-42) and ADG (0-42) are presented in Table 4. Significant differences in total gain and ADG due to the main effects of sex and implant were detected, with steers achieving higher gains than bulls (2.0 and 1.7 lb/d vs 1.6 and 1.3 lb/d, respectively) and implanted cattle in both sexes showing greater gains than those not implanted at processing (2.0 and 1.6 lb/d vs 1.7 and 1.3 lb/d, respectively).

However, implanted bulls had lower gains compared with non-implanted steers. Dry matter intake was not influenced by sex throughout the feeding period (12.6 vs 12.4 lb/d for steers vs bulls). Calves purchased as bulls were treated with Micotil more than steers (58% and 60% of implanted and non-implanted bulls, respectively vs 46% and 44% of implanted and non-implanted steers). Numbers of calves receiving second and third antibiotic treatments were not different among experimental treatments.

Wheat Pasture Performance. Body weights of cattle coming off wheat pasture, total pasture gains, and ADG on wheat are also shown in Table 4. Bulls were kept on pasture an average of 4 days longer than steers. Final body weights off wheat were not significantly influenced by sex, however weights did show a difference due to implants received during the 42-d receiving period. Total body weight gain on wheat pasture was significantly greater for bulls compared with steers, while pasture ADG did not differ among treatments.

Table 4. Effect of estrogenic implant during processing on receiving and wheat pasture performance

	Bulls		Steers			Prob>F		
Item	Implant	No Implant	Implant	No Implant	SE[a]	Sex	Implant	Sex*Implant
BW, lb								
Inwt	536	523	515	522	6.6	.08	.62	.12
d 28	578	557	579	573	7.1	.24	.05	.28
d 42	599	575	601	594	31.7	.16	.04	.27
Off Wheat	804	779	791	779	17.4	.44	.02	.42
Days on Wheat	107	108	103	104	--	--	--	--
Total Gain, lb								
d 0-28	43	35	64	51	3.9	<.0001	<.01	.59
d 0-42	66	54	85	72	20.21	<.0001	<.01	.91
Wheat	205	204	190	186	47.34	.02	.75	.80
Overall	271	258	275	257	27.82	.85	.05	.75
ADG, lb/d								
d 0-28	1.55	1.24	2.28	1.82	.14	<.0001	<.01	.59
d 0-42	1.57	1.28	2.02	1.71	.48	<.0001	<.01	.91
Wheat	1.89	1.85	1.78	1.75	.28	.08	.60	.98
Overall	2.56	2.39	2.68	2.48	.07	.10	<.01	.82

[a]Standard error of the least-squares means

Overall Performance. Final body weight, overall total gain, and overall ADG were significantly influenced by implant treatment received during the first 42 d of the trial (Table 4). Figure 1 shows a linear representation of each treatment group's growth throughout the trial. Bulls that were not implanted during the receiving period did not reach the same final body weight, in the given time, as the other treatments.

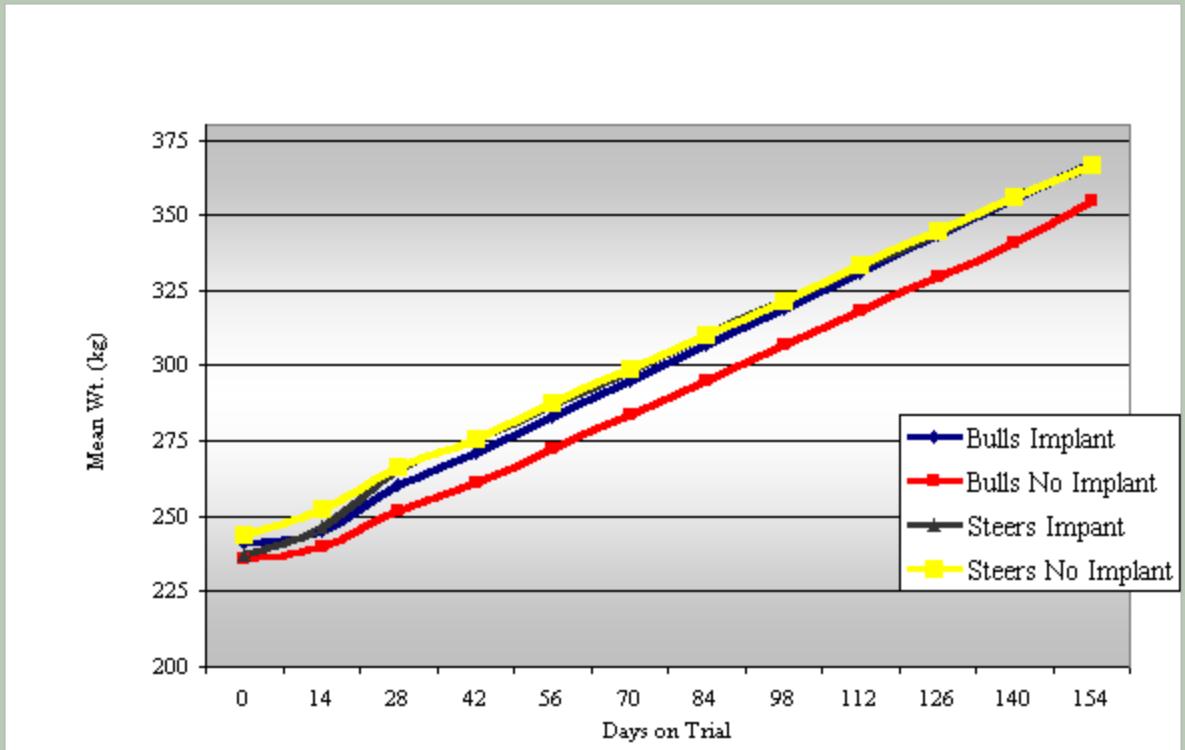

Figure 1. Effect of Treatment on Body Weight Over Entire Trial

Economic Analysis. Table 5 presents the costs incurred for each treatment, relative to our study, along with the required breakeven sale prices, had the cattle been sold between receiving and wheat pasture grazing. The initial cost for cattle bought as steers is based on a weighted average of the actual cost of the cattle in our study. The initial cost of cattle bought as bulls was reduced by $2.90/cwt, based on sale barn averages reported by Smith et al. (2000). The price received for bulls is presumably lower due to the reduced animal performance experienced with these animals subsequent to castration.

Table 5. Total costs and breakeven prices of purchased bulls and steers

Item	Purchased bulls	Purchased steers
Initial purchase cost, $/cwt	83.68	86.58
Average weight, lb	528	536
Total, $/hd	441.83	464.07
Total costs through receiving	489.29	509.81
Processing, $/hd[a]	3.58	3.58
Feed, $/hd	37.54	37.84
Medical, $/hd	6.34	4.32
Total, $/hd	47.46	45.74
Final receiving weight, lb	587	598
Breakeven sale price, $/cwt	83.35	85.25
Total costs through wheat pasture	561.04	575.61
Base cost, $/lb of gain	0.35	0.35
Pounds gained on pasture, lb	205	188

Total, $/hd	71.75	65.8
Final pasture weight, lb	792	785
Breakeven sale price, $/cwt	70.84	73.33
[a]Processing costs do not include fee for castration.		

Implications

Relative to our research, sale-barn calves purchased as bulls and castrated and implanted at processing showed no difference in final body weight as comparable calves purchased as steers after a 42-d receiving period and subsequent wheat pasture grazing. Final body weights were influenced only by the effect of implants given at time of processing. Calves purchased as steers had greater ADG during the receiving period compared with calves purchased as bulls, as did calves of both sexes that were implanted. Cattle bought as bulls compensated for body weight differences after receiving during the grazing period so that total gain did not differ.

Literature Cited

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[2]Bayer Corporation (Clostridium Chauvoei; Septicum, Novyi, Sordellii and Perfingens Types C and D-Enterotoxia)

[3]Merck Animal Health (Ivermectin)

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